



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/027,966

12/20/2001

Rongqing Hui

1780

1436

28004

7590

12/13/2004

SPRINT

6391 SPRINT PARKWAY

KSOPHT0101-Z2100

OVERLAND PARK, KS 66251-2100

EXAMINER

WANG, QUAN ZHEN

ART UNIT

PAPER NUMBER

2633

DATE MAILED: 12/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/027,966

Applicant(s)

HUI ET AL.

Examiner

Quan-Zhen Wang

Art Unit

2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>5/14/02</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 5-6, 10-11, 14-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Buhrer (U.S. Patent US 3,435,229).

Regarding claims 1 and 10, Buhrer teaches an apparatus and method (fig. 1) to process a received optical signal that carries user information, the apparatus and method comprising: a splitter (fig. 1, 40) configured to split the received optical signal based on polarization into a first optical signal and a second optical signal (fig. 1, E43 and E44), a first converter (fig. 1, 43) connected to the splitter and configured to convert the first optical signal into a corresponding first electrical signal (fig. 1, E22), a second converter (fig. 1, 42) connected to the splitter and configured to convert the second optical signal into a corresponding second electrical signal (fig. 1, E21); and a detection system (fig. 1, 50 and 51) applying radio frequency detection (fig. 1, 51) to the first electrical signal to generate a third electrical signal (fig. 1, E25), applying radio frequency detection (fig. 1, 50) to the second electrical signal to generate a fourth electrical signal (fig. 1, E24), and combining the third and fourth electrical signal to form a fifth electric signal that carries the user information (fig. 1, E26).

Regarding claims 2 and 11, an optical signal propagating in an optical fiber naturally aligned with the principal states of polarization of the optical fiber.

Regarding claims 5, 14, Buhrer further teaches that the RF detection to the first electrical signal to generate the third electrical signal further comprises generating an (sixth) electric signal (fig. 1, 53) and mixing the electrical signal with the first electrical signal (fig. 1, 51).

Regarding claims 6, 15, Buhrer further teaches that the RF detection to the second electrical signal to generate the fourth electrical signal further comprises shifting a phase of the electrical signal (fig. 1, 52) and mixing the electrical signal with the second electrical signal (fig. 1, 50).

3. Claims 1, 7-8, 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibutani (U.S. Patent US 4,972,515).

Regarding claims 1 and 10, Shibutani teaches an apparatus and method (fig. 1) to process a received optical signal that carries user information, the apparatus and method comprising: a splitter (fig. 1, 15) configured to split the received optical signal based on polarization into a first optical signal and a second optical signal (fig. 1, arrows from 15 to 16 and 17), a first converter (fig. 1, 16) connected to the splitter and configured to convert the first optical signal into a corresponding first electrical signal (fig. 1, the arrow output from 16), a second converter (fig. 1, 17) connected to the splitter and configured to convert the second optical signal into a corresponding second electrical signal (fig. 1, the arrow output from 17); and detection systems (fig. 1, 31 and

32) applying radio frequency detection (fig. 1, 35) to the first electrical signal to generate a third electrical signal, applying radio frequency detection (fig. 1, 38) to the second electrical signal to generate a fourth electrical signal, and combining the third and fourth electrical signal (fig. 1, 43) to form a fifth electric signal that carries the user information (fig. 1, 12).

Regarding claims 7-8, Shibutani further teaches to apply bandpass filters (fig. 1, 34, 37) to the first and second electrical signals, and apply square law detectors (fig. 1, 35, and 38) to the first and second electrical signals.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 5, 9-10, 14, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lima et al. (Lima, A.O.; Lima, I.T., Jr.; Adali, T.; Menyuk, C.R.; PMD mitigation using diversity detection; Ultralong Haul DWDM Transmission and Networking/WDM Components, 2001 Digest of the LEOS Summer Topical Meetings , 30 July-1 Aug. 2001; pages 17-18) in view of Way et al. (U.S. Patent Application Publication US 2002/0030877 A1).

Regarding claims 1 and 10, Lima teaches an apparatus and method (fig. 1a) to process a received optical signal that carries user information, the apparatus and

Art Unit: 2633

method comprising: a splitter (fig. 1a, LPBS) configured to split the received optical signal based on polarization into a first optical signal and a second optical signal (fig. 1a, the two lines connected to top and bottom of the top LPBS), a first converter connected to the splitter and configured to convert the first optical signal into a corresponding first electrical signal, a second converter connected to the splitter and configured to convert the second optical signal into a corresponding second electrical signal (fig. 1a, the top two photodetectors); and a detection system (fig. 1a, the top two CRC's) connected to the first converter and the second converter and configured to process the first electrical signal to generate a third electrical signal, to process the second electrical signal to generate a fourth electrical signal, and combine (fig. 1a, the top Combiner/Equalizer, structure is shown in fig. 2c) the third electrical signal and the fourth electrical signal to form a fifth electrical signal (fig. 1a, the line connected to the right hand side of the top Combiner/Equalizer) that carries the user information. Lima differs from the claimed invention in that Lima does not specifically teach to apply radio frequency (RF) detection to the first electrical signal to generate a third electrical signal, and apply radio frequency detection to the second electrical signal to generate a fourth electrical signal. However, Way discloses an apparatus (fig. 1) to demodulate a subcarrier modulated signal by applying RF detection (fig. 1, 44). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the RF detection method disclosed by Way to replace the CRC's in the apparatus taught by Lima in order to perform RF demodulating to extract user signals from a subcarrier modulated signal.

Regarding claims 5, 14, Way further teaches that the RF detection to the first electrical signal to generate the third electrical signal further comprises generating an (sixth) electric signal (fig. 1, 46) and mixing the electrical signal with the first electrical signal (fig. 1, 44).

Regarding claims 9 and 18, Way further teaches that the optical signal is a sub-carrier modulated signal (paragraph 0005, lines 10-17).

2. Claims 1, 3-4, 10, 12-13, are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art in view of Buhrer (U.S. Patent US 3,435,229).

Regarding claims 1 and 10, the admitted prior art (fig. 1) teaches an apparatus and method of processing a received optical signal that carries user information, the apparatus and method comprising: splitting (fig. 1, 110) the received optical signal based on polarization into a first optical signal (fig. 1, 114) and a second optical signal (fig. 1, the signal passing through 112). The admitted prior art (fig. 1) differs from the claimed invention in that the admitted prior art (fig. 1) does not specifically teach converting the first optical signal into a corresponding first electrical signal; converting the second optical signal into a corresponding second electrical signal; applying radio frequency detection to the first electrical signal to generate a third electrical signal, applying radio frequency detection to the second electrical signal to generate a fourth electrical signal, and combining the third and fourth electrical signal to form a fifth electric signal that carries the user information. However, Buhrer teaches converting the first optical signal into a corresponding first electrical signal (fig. 1, E22); converting

the second optical signal into a corresponding second electrical signal (fig. 1, E21); applying radio frequency detection (fig. 1, 51) to the first electrical signal to generate a third electrical signal (fig. 1, E25), applying radio frequency detection (fig. 1, 50) to the second electrical signal to generate a fourth electrical signal (fig. 1, E24), and combining the third and fourth electrical signal to form a fifth electric signal that carries the user information (fig. 1, E26). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the signal detection method taught by Buhrer in the apparatus taught by the admitted prior art (fig. 1) in order to increase the reception sensitivity of optical signals using a polarization diversity receiving device.

Regarding claim 3-4, 12-13, the admitted prior art, fig. 1 of the current application, further teaches to control the polarization of the optical signal to align with the polarization of the received optical signal with a principle axis of the polarization beam splitter, and the polarization controller is controlled by instructions from a feedback loop that processes the electrical signal that carries the user information, and this signal reads the claimed fifth electrical signal.

3. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buhrer (U.S. Patent US 3,435,229) in view of Shibutani (U.S. Patent US 4,972,515).

Regarding claims 16-17, Buhrer differs from the claimed invention in that Buhrer does not specifically teach to apply bandpass filters to the first and second electrical signals, and apply square law detectors to the first and second electrical signals.

Art Unit: 2633

However, Shibutani further teaches to apply bandpass filters (fig. 1, 34, 37) to the first and second electrical signals, and apply square law detectors (fig. 1, 35, and 38) to the first and second electrical signals. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply bandpass filters to the first and second electrical signals; and applying square law detectors to the first and second electrical signals to process the first and second electrical signals, as it is taught by Shibutani, in the apparatus taught by Buhner in order to reject out-band noises and identify the spectral or frequency components of the optical signal which have been reduced in magnitude or nullified due to dispersion.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shibutani (U.S. Patent US 5,138,476) and Shibutani (U.S. Patent US 4,972,515) teach polarization diversity heterodyne receiving devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 8:30 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2633

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw


M. R. SEDIGHIAN
PRIMARY EXAMINER